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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/985,674	11/05/2001	Yukiko Hanada	215754US2	4033

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EXAMINER	
HAILE, FEBEN	
ART UNIT	**PAPER NUMBER**
2663	

DATE MAILED: 09/21/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/985,674	HANADA ET AL.	
	Examiner	Art Unit	
	Feben M. Haile	2663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 November 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-36* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *9,11,13,14,16,21,24-26,35 and 36* is/are allowed.

6)☒ Claim(s) *1,3,8,10,12,15,17,18,22 and 27* is/are rejected.

7)☒ Claim(s) *2,4-7,19,20,23 and 28-34* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *05 November 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *June 18, 2004*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

1. Claim 27 is rejected under 35 U.S.C. 102(e) as being anticipated by Sudo (US 6,647,025), hereinafter referred to as Sudo.

Regarding claim 27, Sudo discloses an FFT timing detection step of detecting a plurality of FFT timing candidates according to a correlation characteristic of a guard interval contained in a received multicarrier signal **(figure 3 and column 3 lines 23-29; an OFDM reception apparatus uses correlation values for obtaining FFT timing of a frame structure which includes a guard interval)**.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1 and 3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nowara (US 6,445,713), hereinafter referred to as Nowara in view of Muto (US 5,933,424), hereinafter referred to as Muto.

Regarding claim 1, Nowara discloses a data channel generator multiplying a plurality of transmission data sequences by a plurality of short codes **(column 3 lines 45-49; a signal is diffused by a short code)**, respectively; a long code multiplier multiplying the plurality of transmission data sequences multiplied by the plurality of the short codes by a common long code, respectively **(column 3 lines 45-49; signal is diffused by a long code)**; and a transmission element transmitting, by using a plurality of subcarriers, the transmission data sequences doubly multiplied by the short code and the long code **(column 3 lines 45-49; a signal which is doubly diffused by a short and long code is multiplexed among a plurality of channels)**.

Nowara fails to teach, a synchronization signal generator multiplying a transmission data sequence for synchronization signal only by a spreading code for synchronization signal; and transmitting the synchronization signal multiplied only by the spreading code for synchronization signal.

Muto discloses a sync signal generator that generates a predetermined Walsh code 32, multiplies this code by a PN code; and transmitting the synchronization signal multiplied only by the spreading code for synchronization signal **(figure 2 units 12 and 31 and column 3 lines 36-47)**.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Nowara to incorporate the element by Muto. The

motivation being to provide a device within a CDMA system that is capable of avoiding instantaneous interruption

Regarding claim 3, Nowara discloses transmitting, by using a plurality of subcarriers, a data sequence doubly multiplied by a short code and a long code **(column 3 lines 45-49; a signal which is doubly diffused by a short and long code is multiplexed among a plurality of channels)**.

Muto discloses a sync signal generator that generates a predetermined Walsh code 32, multiplies this code by a PN code; and transmitting the synchronization signal multiplied only by the spreading code for synchronization signal **(figure 2 units 12 and 31 and column 3 lines 36-47)**.

Since Nowara discloses transmitting a doubly diffused CDMA signal by a plurality of channels, it is obvious that the doubly multiplied sync signal generated by Muto could also by transmitted by either one or a plurality of channels **(transmitting, by using one for a plurality of subcarriers, a synchronization signal multiplied only by a spreading code for synchronization signal).**

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Nowara to incorporate the element by Muto. The motivation being to provide a device within a CDMA system that is capable of avoiding instantaneous interruption.

3. Claims 8, 10 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto et al. (US 6,646,980), hereinafter referred to as Yamamoto in view of

Aslanis et al. (US 2004/0199554), hereinafter referred to as Aslanis in view of Sudo (US 6,647,025), hereinafter referred to as Sudo in view of Higuchi et al. (US 6,167,037), hereinafter referred to as Higuchi.

Regarding claims 8 and 17, Yamamoto discloses a receiving element receiving the multicarrier signal containing the subcarriers at least one of which a synchronization signal is transmitted therein, multiplied only by a spreading code for synchronization signal **(column 1 lines 66- column 2 line 3; an OFDM demodulator is capable of detecting a preamble for synchronization using short symbols)**.

Yamamoto fails to teach a correlator detecting correlation values between the received multicarrier signal and a synchronization signal replica.

Aslanis discloses a multicarrier receiver that correlates a frame with a synchronizing pattern stored at the receiver **(page 2 paragraph 0016)**.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Yamamoto to incorporate the teachings of Aslanis. The motivation being an improved method of providing frame synchronization in a transmission system using multicarrier modulation.

Yamamoto as modified by Aslanis fails to teach a timing detector detecting an FFT timing according to correlation values.

Sudo discloses an OFDM reception apparatus that uses correlation values to obtain FFT timings **(column 3 lines 23-29)**.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the combination of Yamamoto and Aslanis to incorporate

the teachings of Sudo. The motivation being an OFDM reception apparatus which improves the accuracy of symbol synchronization acquisition.

The combination of Yamamoto and Aslanis as modified by Sudo fails to teach a timing detector detecting a received timing of long code according to the correlation values

Higuchi disclose a mobile station that uses correlations to detect the received timing of long codes **(column 15 lines 34-38)**.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the combination of Yamamoto, Aslanis, and Sudo to incorporate the teachings of Higuchi. The motivation being to provide a signal transmission method, which can achieve fast, highly accurate acquisition of the spreading codes in a mobile station in a communication system using long codes.

Regarding claim 10, Yamamoto discloses a receiving element receiving the multicarrier signal containing the subcarriers, at least one of which a synchronization signal is transmitted therein, multiplied only by a spreading code for synchronization signal **(column 1 lines 66- column 2 line 3; an OFDM demodulator is capable of detecting a preamble for synchronization using short symbols)**; and a subcarrier separator carrying out FFT operations at a plurality of FFT timing candidates to separate the received multicarrier signal into a plurality of subcarrier components **(column 2 lines 25-28; an OFDM demodulator comprises an FFT that divides an output signal into respective subcarriers)**.

Yamamoto fails to teach a correlator detecting correlation values between the subcarrier components that carry the synchronization signal and a synchronization signal replica

Aslanis discloses a multicarrier receiver that correlates a frame with a synchronizing pattern stored at the receiver **(page 2 paragraph 0016)**.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Yamamoto to incorporate the teachings of Aslanis. The motivation being an improved method of providing frame synchronization in a transmission system using multicarrier modulation.

Yamamoto as modified by Aslanis fails to teach a timing detector detecting a received timing of long code according to the correlation values.

Higuchi disclose a mobile station that uses correlations to detect the received timing of long codes **(column 15 lines 34-38)**.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the combination of Yamamoto, Aslanis to incorporate the teachings of Higuchi. The motivation being to provide a signal transmission method, which can achieve fast, highly accurate acquisition of the spreading codes in a mobile station in a communication system using long codes.

The combination of Yamamoto and Aslanis as modified by Higuchi fails to teach a timing detector detecting a received timing of long code according to the correlation values.

Sudo discloses an OFDM reception apparatus that uses correlation values to obtain FFT timings **(column 3 lines 23-29)**.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the combination of Yamamoto, Aslanis, and Higuchi to incorporate the teachings of Sudo. The motivation being an OFDM reception apparatus which improves the accuracy of symbol synchronization acquisition.

Regarding claim 15, Yamamoto discloses a receiving element receiving the multicarrier signal containing the subcarriers, at least one of which a synchronization signal is transmitted therein, multiplied only by a spreading code for synchronization signal **(column 1 lines 66- column 2 line 3; an OFDM demodulator is capable of detecting a preamble for synchronization using short symbols)**; and a subcarrier separator carrying out FFT at the FFT timing to separate the received multicarrier signal into a plurality of subcarrier components **(column 2 lines 25-28; an OFDM demodulator comprises an FFT that divides an output signal into respective subcarriers)**.

Yamamoto fails to teach an FFT timing detector detecting an FFT timing according to a correlation characteristic of a guard interval contained in the received multicarrier signal **(figure 3 and column 3 lines 23-29; an OFDM reception apparatus uses correlation values for obtaining FFT timing of a frame structure which includes a guard interval)**.

Sudo discloses an OFDM reception apparatus that uses correlation values to obtain FFT timings **(column 3 lines 23-29)**.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Yamamoto to incorporate the teachings of Sudo. The motivation being an OFDM reception apparatus which improves the accuracy of symbol synchronization acquisition.

Yamamoto as modified by Sudo fails to teach a timing detector detecting a received timing of long code according to the correlation values.

Aslanis discloses a multicarrier receiver that correlates a frame with a synchronizing pattern stored at the receiver **(page 2 paragraph 0016)**.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the combination of Yamamoto and Sudo to incorporate the teachings of Aslanis. The motivation being an improved method of providing frame synchronization in a transmission system using multicarrier modulation.

The combination of Yamamoto and Sudo as modified by Aslanis as modified by fails to teach a timing detector detecting a received timing of long code according to the correlation values **(column 15 lines 34-38; a mobile station uses correlations to detect the received timing of the long code)**.

Higuchi disclose a mobile station that uses correlations to detect the received timing of long codes **(column 15 lines 34-38)**.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the combination of Yamamoto, Sudo, and Aslanis to incorporate the teachings of Higuchi. The motivation being to provide a signal

transmission method, which can achieve fast, highly accurate acquisition of the spreading codes in a mobile station in a communication system using long codes.

4. Claims 12 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamamoto et al. (US 6,646,980), hereinafter referred to as Yamamoto in view of Aslanis et al. (US 2004/0199554), hereinafter referred to as Aslanis in view of Higuchi et al. (US 6,167,037), hereinafter referred to as Higuchi.

Regarding claims 12 and 18, Yamamoto discloses a receiving element receiving the multicarrier signal containing the subcarriers, at least one of which a synchronization signal is transmitted therein, multiplied only by a spreading code for synchronization signal **(column 1 lines 66- column 2 line 3; an OFDM demodulator is capable of detecting a preamble for synchronization using short symbols)**; and a subcarrier separator separating the received multicarrier signal into a plurality of subcarrier components **(column 2 lines 25-28; an OFDM demodulator comprises an FFT that divides an output signal into respective subcarriers)**.

Yamamoto fails to teach a correlator detecting correlation values between the subcarrier components that carry the synchronization signal and a synchronization signal replica **(page 2 paragraph 0016; a multicarrier receiver that correlates a frame with a synchronizing pattern stored at the receiver)**.

Aslanis discloses a multicarrier receiver that correlates a frame with a synchronizing pattern stored at the receiver **(page 2 paragraph 0016)**.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Yamamoto to incorporate the teachings of Aslanis. The motivation being an improved method of providing frame synchronization in a transmission system using multicarrier modulation.

Yamamoto as modified by Aslanis fails to teach a timing detector detecting a received timing of long code according to the correlation values **(column 15 lines 34-38; a mobile station uses correlations to detect the received timing of the long code)**.

Higuchi disclose a mobile station that uses correlations to detect the received timing of long codes **(column 15 lines 34-38)**.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the combination of Yamamoto and Aslanis to incorporate the teachings of Higuchi. The motivation being to provide a signal transmission method, which can achieve fast, highly accurate acquisition of the spreading codes in a mobile station in a communication system using long codes.

5. Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sudo (US 6,647,025), hereinafter referred to as Sudo in view of Yamamoto et al. (US 6,646,980), hereinafter referred to as Yamamoto in view of Aslanis et al. (US 2004/0199554), hereinafter referred to as Aslanis in view of Higuchi et al. (US 6,167,037), hereinafter referred to as Higuchi.

Regarding claim 22, Sudo discloses an FFT timing detection step of detecting an FFT timing according to a correlation characteristic of a guard interval contained in the received multicarrier signal **(figure 3 and column 3 lines 23-29; an OFDM reception apparatus uses correlation values for obtaining FFT timing of a frame structure which includes a guard interval)**.

Sudo fails to teach a separation step of carrying out FFT at the detected FFT timing, to separate the received multicarrier signal into a plurality of subcarrier components.

Yamamoto discloses an OFDM demodulator that comprises an FFT, which divides an output signal into respective subcarriers **(column 2 lines 25-28)**.

It would have obvious to one having ordinary skill in the art at the time the invention was made to modify Sudo to incorporate the teachings of Yamamoto. The motivation being an OFDM demodulator capable of easily detecting a preamble for timing/carrier frequency synchronization using short symbols with high detection accuracy.

Sudo as modified by Yamamoto fails to teach a correlation detection step of detecting correlation values between subcarriers that carry a synchronization signal among the separated subcarriers and a synchronization signal replica.

Aslanis discloses a multicarrier receiver that correlates a frame with a synchronizing pattern stored at the receiver **(page 2 paragraph 0016)**.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the combination of Yamamoto and Sudo to incorporate

the teachings of Aslanis. The motivation being an improved method of providing frame synchronization in a transmission system using multicarrier modulation.

The combination of Sudo and Yamamoto as modified by Aslanis fails to teach a timing detection step of detecting a received timing of long code according to the correlation values.

Higuchi disclose a mobile station that uses correlations to detect the received timing of long codes **(column 15 lines 34-38)**.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the combination of Sudo, Yamamoto and Aslanis to incorporate the teachings of Higuchi. The motivation being to provide a signal transmission method, which can achieve fast, highly accurate acquisition of the spreading codes in a mobile station in a communication system using long codes.

Allowable Subject Matter

6. Claims 2, 4-7, 19-20, 23, and 28-34 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. Claims 9, 11, 13-14, 16, 21, 24-26, and 35-36 are allowed.

Regarding claims 9, 11, 13-14, 16, 21, and 26, the prior art of record fails to disclose or fairly suggest a second correlator detecting, at the detected received timing of long code, correlation values between the sub carrier components and a plurality of

replicas of data sequence double multiplied by a short code and each long code chosen from a long code group.

Regarding claim 24, the prior art of record fails to disclose or fairly suggest a timing detector firstly selecting a maximum correlation value and a corresponding timing from the values in the first memory as an FFT timing candidate #1 and storing the FFT timing candidate #1 in the second memory, subsequently making the search rang setter set a new search range according to the values stored in the first memory and the FFT timing candidate previously stored in the second memory, selecting a maximum correlation value and a corresponding timing from the values within the search range previously set as an FFT timing candidate #2 and storing the FFT timing candidate #2 in the second memory, and repeating the same operations of setting a new search range and selecting an FFT timing candidate of next number until detecting a predetermined number of FFT timing candidates.

Regarding claim 35, the prior art of record fails to disclose or fairly suggest accumulating coherently the integrated value of each subcarrier for Ncs consecutive subcarriers along a frequency axis, where Ncs is an integer satisfying 1<=Ncs<=N, and N is the number of the subcarriers; and detecting averaged correlation values by averaging Nps accumulated value of every Ncs subcarriers by squared form along the frequency axis, wherein Nps is an integer satisfying 1<=Nps<=Nc/Ncs.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

a) Akiyama (US 6,907,026), Receiving Apparatus for Signal Transmission System of Orthogonal Frequency Division Multiplexing Type

b) Abeta et al. (US 2002/0136176), Signal Format in Multi-Carrier CDMA Transmission System

c) Lee et al. (US 2004/0141481), Transmitter Device and Transmitting Method using OFDM ND MC-CDMA

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Feben M. Haile whose telephone number is (571) 272-3072. The examiner can normally be reached on 6:00am - 3:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky Ngo can be reached on (571) 272-3139. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

09/19/2005

RICKY NGO
PRIMARY EXAMINER